GENERAL APPLICATION FASTENERS

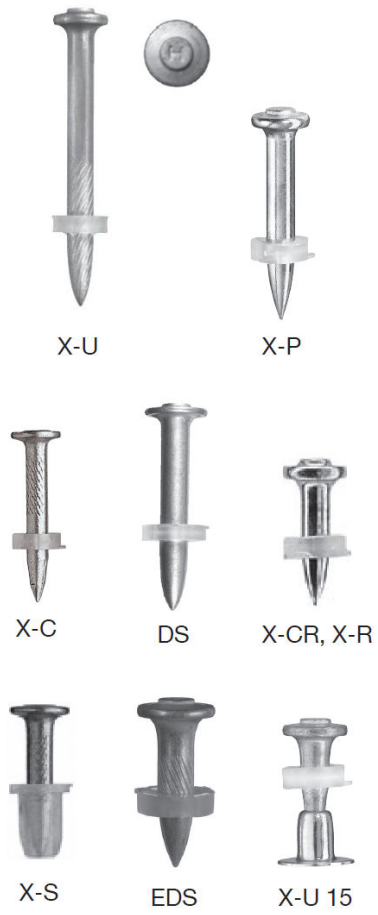
Technical Supplement

March 2025

TABLE OF CONTENTS

GENERAL APPLICATION FASTENERS

PRODUCT DESCRIPTION



Approval/listings

ICC-ES (International Code Council)
ESR-2269 with LABC/LARC Supplement (X-P, X-U, and X-U 15)
ESR-1663 with LABC/LARC Supplement (DS, EDS, X-CR, X-R, X-C)
ESR-1752 with LABC/LARC Supplement (X-C, Gas-, and Battery-Actuated Fasteners)

X-U Universal Series This universal high performance fastener is designed for applications in concrete and high strength or standard strength steel. The shank diameter is consistent through the fastener offering at 0.157". X-U fastener lengths range from 5/8" through 2-7/8" and are available as single fasteners (P8) or collated (MX) in strips of 10. All X-U fasteners have a unique twist knurling reaching 7/8" up the shank.

X-P Premium Concrete Fastener The X-P fastener is optimized for high performance in concrete base materials. With a shank diameter of 0.157”, an optimized conical tip design, and high steel hardness, the X-P is designed for demanding concrete applications, in base materials up to 8,000 psi in strength. The X-P fastener is available in lengths ranging from 5/8” to 1-9/16”, making it ideal for drywall track to concrete applications. X-P fasteners are available as single fasteners (P8) or collated (MX) in strips of 10.

X-CR and X-R Fastener Series The X-CR is a high performance, corrosion resistant fastener equivalent to SAE 316 stainless steel. This fastener is ideally suited for applications where corrosion is a concern whether on concrete or steel base materials. The X-CR is designed mainly for concrete applications and is offered as a single (P8) fastener in lengths from 5/8" through 2-1/8". The X-R fastener is intended for steel applications and is offered in 1/2” shank length. Shank diameter for these fasteners is 0.145" for shank lengths less than 1-1/2" and 0.157" for longer fasteners.

Gas and Battery Series Specialized series of fasteners are designed for compatibility with Hilti GX 2 and GX 3 gas-actuated and BX 3 and BX 4 battery-actuated tools. These collated fastener lines are designed for applications in interior finishing and mechanical/electrical trades. X-C /G2/G3/B3/B4 fasteners are used for fastening to concrete and masonry. The X-P G2/G3/B3/B4 premium fasteners are capable of fastening to masonry, concrete, and steel materials. The X-S G2/G3/B3/B4 is designed for fastening to steel and provides and economical option with the shortest length. For more details refer to Drywall Track Fastening.

X-C Standard Series The X-C series of fasteners is a cost effective solution for applications in concrete and masonry. This fastener is not suited for fastening to steel base materials. Fastener lengths range from 3/4" through 2-7/8" with a shank diameter of 0.138". X-C fasteners are offered in a single (P8) fastener version as well as in collated (MX) strips of 10.

X-S Steel Fastener The X-S is an economical fastener for steel. It has a 0.145" smooth shank diameter and is offered in a 1/2" and 5/8" length. The X-S13 comes collated (MX) in strips of 10 or individually with a plastic “tophat” (THP). The X-S16 comes singly with a metal "tophat" (TH). This fastener is ideally suited for fastening drywall track to standard strength steel and is discussed further in Drywall Track Fastening.

DS/EDS Fastener Series The DS series fastener is a high performance fastener of 0.177" shank diameter suitable for both concrete and steel applications. It is offered in a single fastener version only with a 10 mm dome head design and a 10 mm guidance washer. Available lengths are 3/4" through 2-1/2". Knurling is offered on 3/4" and 7/8" lengths; designated as EDS and ideally suited for steel applications.

X-U 15 Steel Fastener The X-U 15 is a premium, high performance fastener designed specifically for attachments to steel (e.g. drywall track, tagging, etc.). It is offered in a 0.145" shank diameter and 5/8" length with a unique step shank design as either single fasteners with metal tophat or collated in strips of 10.

MATERIAL SPECIFICATIONS

Fastener designation	Fastener material	Fastener plating[1]	Steel washer or clip material[1, 2]	Washer or clip plating[1, 2]
X-P	Carbon Steel	5 µm Zinc	N/A	N/A
X-U	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc
DS/EDS	Carbon Steel	5 µm Zinc	N/A	N/A
X-C	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc
X-R, X-CR[3]	SAE 316	N/A	SAE 316	N/A
X-C/ X-P/ X-S: G2/G3/B3/B4	Carbon Steel	2-10 µm Zinc	N/A	N/A
X-CT Forming Nail	Carbon Steel	5 µm Zinc	N/A	N/A
BC X-C	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc

[1]The 5 µm zinc coating is in accordance with ASTM B 633, SC 1, Type III. Refer to Section 2.3.3.1 for more information.
[2]Most fasteners have a plastic washer for guidance when installing. Not all fastener lengths have a pre-mounted steel washer. Refer to Power-Actuated Fastener and Tool Selection Guide for more information on available fasteners.
[3]The X-CR and X-R fastener material is a proprietary material, which provides a corrosion resistance equivalent to SAE 316 stainless steel. The steel washer material is SAE 316 stainless steel.

TECHNICAL DATA

Table 1. Allowable loads in normal weight concrete[1,2]

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Concrete compressive strength							
				2000 psi		4000 psi		6000 psi		8000 psi	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
Premium Concrete Fastener	X-P*	**0.157** (4.0)	**3/4** (19)	**100** (0.44)	**155** (0.69)	**100** (0.44)	**175** (0.78)	**105** (0.47)	**205** (0.91)	**135** (0.60)	**205** (0.91)
			1 (25)	**165** (0.73)	**220** (0.98)	**180** (0.80)	**225** (1.00)	**150** (0.67)	**300** (1.33)	**150** (0.67)	**215** (0.96)
			1-1/4 (32)	**240** (1.07)	**310** (1.38)	**280** (1.25)	**310** (1.38)	**180** (0.80)	**425** (1.89)	–	–
			1-1/2 (38)	**310** (1.38)	**420** (1.87)	–	–	–	–	–	–
Universal Knurled Shank Fasteners	X-U*	**0.157** (4.0)	**3/4** (19)	**100** (0.44)	**125** (0.57)	**100** (0.44)	**125** (0.57)	**105** (0.47)	**205** (0.91)	–	–
			1 (25)	**165** (0.73)	**190** (0.85)	**170** (0.76)	**225** (1.00)	**110** (0.49)	**280** (1.25)	–	–
			1-1/4 (32)	**240** (1.07)	**310** (1.38)	**280** (1.25)	**310** (1.38)	**180** (0.80)	**425** (1.89)	–	–
			1-1/2 (38)	**275** (1.22)	**420** (1.87)	**325** (1.45)	**420** (1.87)	–	–	–	–
Standard Fastener	X-C	**0.138** (3.5)	**3/4** (19)	**45** (0.20)	**75** (0.33)	**65** (0.29)	**105** (0.47)	**95** (0.42)	**195** (0.87)	–	–
			1 (25)	**85** (0.38)	**150** (0.67)	**160** (0.71)	**200** (0.89)	**105** (0.47)	**270** (1.20)	–	–
			1-1/4 (32)	**130** (0.58)	**210** (0.93)	**270** (1.20)	**290** (1.29)	**165** (0.73)	**325** (1.45)	–	–
			1-1/2 (38)	**175** (0.78)	**260** (1.16)	**270** (1.20)	**360** (1.60)	–	–	–	–
Heavy Duty Fastener	DS	**0.177** (4.5)	**3/4** (19)	**50** (0.22)	**120** (0.53)	**125** (0.56)	**135** (0.60)	–	–	–	–
			1 (25)	**130** (0.58)	**195** (0.87)	**155** (0.69)	**240** (1.07)	–	–	–	–
			1-1/4 (32)	**220** (0.98)	**385** (1.71)	**270** (1.20)	**425** (1.89)	–	–	–	–
			1-1/2 (38)	**300** (1.33)	**405** (1.80)	**355** (1.58)	**450** (2.00)	–	–	-	-
Stainless Steel Fastener	X-CR	**0.145** (3.7)	**3/4** (19)	**30** (0.13)	**40** (0.18)	**65** (0.29)	**40** (0.18)	–	–	–	–
			1 (25)	**55** (0.24)	**185** (0.82)	**120** (0.53)	**190** (0.85)	**100** (0.44)	**170** (0.76)	–	–
			1-1/4 (32)	**110** (0.49)	**290** (1.29)	**125** (0.56)	**300** (1.33)	**120** (0.53)	**440** (1.96)	–	–
			1-1/2 (38)	**265** (1.18)	**405** (1.80)	**350** (1.56)	**450** (2.00)	–	–	–	–
Gas & Battery Fasteners	X-C G3, X-C B3, X-C B4 (except 36- and 39-mm lengths)	**0.118** (3.0)	**3/4** (19)	**60** (0.25)	**90** (0.4)	**60** (0.25)	**90** (0.4)	–	–	–	–
	X-C G2 (except X-C 39 G2), X-C 36 B3, X-C 39 B4	**0.108** (2.75)	**3/4** (19)	**60** (0.25)	**90** (0.4)	**60** (0.25)	**90** (0.4)	–	–	–	–
	X-C 39 G2, X-C 39 G3	**0.101** (2.6)	**5/8** (16)	**50** (0.2)	**80** (.35)	**50** (0.2)	**80** (.35)	–	–	–	–
Premium Gas & Battery Fasteners	X-P G2, X-P G3, X-P B3, X-P B4	**0.118** (3.0)	**5/8** (16)	**50** (0.2)	**90** (0.4)	**50** (0.2)	**120** (0.5)	**50** (0.2)	**90** (0.4)	–	–
			3/4 (19)	**80** (0.4)	**120** (0.5)	**50** (0.2)	**120** (0.5)	**50** (0.2)	**90** (0.4)	–	–
Forming Fastener	X-CT 47[3]	**0.145** (3.7)	**1** (25)	**60** (0.27)	**65** (0.29)	–	–	–	–	–	–
	X-CT 62[3]	**0.145** (3.7)	**1** (25)	**75** (0.33)	**75** (0.33)	–	–	–	–	–	–

[1]The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
[2]Multiple fasteners are recommended for any attachment.
[3]For temporary fastening of formwork only.

*More details about the innovative X-P and X-U fasteners can be found in X-P Premium Concrete Fasteners and X-U Universal Knurled Shank Fasteners.

Table 2. Allowable loads in minimum f'$_c$ = 3000 psi structural lightweight concrete[1,2]

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Fastener location					
				Installed into concrete		Installed through 3" deep metal deck into concrete[3,4]			
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)		Shear lb (kN)	
						Upper flute	Lower flute	Upper flute	Lower flute
Premium Concrete Fastener	X-P*	**0.157** (4.0)	**3/4** (19)	**155** (0.7)	**165** (0.7)	**130** (0.6)	**105** (0.5)	**285** (1.3)	**285** (1.3)
			1 (25)	**225** (1.0)	**300** (1.3)	**215** (1.0)	**165** (0.7)	**340** (1.5)	**340** (1.5)
			1-1/4 (32)	**325** (1.4)	**445** (2.0)	**295** (1.3)	**230** (1.0)	**375** (1.7)	**375** (1.7)
			1-1/2 (38)	**425** (1.9)	**480** (2.1)	**400** (1.8)	**330** (1.5)	**365** (1.6)	**365** (1.6)
Universal Knurled Shank Fasteners	X-U*	**0.157** (4.0)	**3/4** (19)	**125** (0.56)	**115** (0.51)	**130** (0.58)	**95** (0.42)	**245** (1.1)	**245** (1.1)
			1 (25)	**205** (0.91)	**260** (1.16)	**215** (0.96)	**155** (0.69)	**330** (1.5)	**330** (1.5)
			1-1/4 (32)	**315** (1.40)	**435** (1.93)	**295** (1.31)	**200** (0.89)	**375** (1.7)	**375** (1.7)
			1-1/2 (38)	**425** (1.89)	**475** (2.11)	**400** (1.78)	**260** (1.16)	**430** (1.9)	**430** (1.9)
Standard Fastener	X-C	**0.138** (3.5)	**3/4** (19)	**120** (0.53)	**175** (0.78)	**120** (0.53)	**95** (0.42)	**265** (1.2)	**265** (1.2)
			1 (25)	**180** (0.80)	**260** (1.16)	**215** (0.96)	**155** (0.69)	**485** (2.2)	**485** (2.2)
			1-1/4 (32)	**225** (1.00)	**400** (1.78)	**250** (1.11)	**200** (0.89)	**500** (2.2)	**500** (2.2)
			1-1/2 (38)	**285** (1.27)	**400** (1.78)	**285** (1.27)	**210** (0.93)	**555** (2.5)	**555** (2.5)
Heavy Duty Fastener	DS[5]	**0.177** (4.5)	**3/4** (19)	**100** (0.44)	**200** (0.89)	**100** (0.44)	**–**	**200** (0.9)	**200** (0.9)
			1 (25)	**180** (0.80)	**360** (1.60)	**180** (0.80)	**180** (0.80)	**405** (1.8)	**405** (1.8)
			1-1/4 (32)	**300** (1.33)	**520** (2.31)	**300** (1.33)	**250** (1.11)	**515** (2.3)	**515** (2.3)
			1-1/2 (38)	**450** (2.00)	**680** (3.02)	**450** (2.00)	**325** (1.45)	**625** (2.8)	**625** (2.8)
Stainless Steel Fastener	X-CR	**0.145** (3.7) **0.157** (4.0)	**1** (25)	**230** (1.02)	**240** (1.07)	**230** (1.02)	**–**	**240** (1.1)	**240** (1.1)
			1-1/4 (32)	**320** (1.42)	**400** (1.78)	**320** (1.42)	**–**	**400** (1.8)	**400** (1.8)
			1-1/2 (38)	**405** (1.80)	**500** (2.22)	**405** (1.80)	**–**	**500** (2.2)	**500** (2.2)
Gas & Battery Fasteners	X-C G3, X-C B3, X-C B4 (Except 36- & 39-mm lengths)	**0.118** (3.0)	**3/4**[6] (19)	**115** (0.5)	**140** (0.6)	**75** (0.3)	**85** (0.4)	**175** (0.8)	**215** (1.0)
			1 (25)	**170** (0.8)	**220** (1.0)	**155** (0.7)	**160** (0.7)	**255** (1.1)	**315** (1.4)
	X-C G2 (except X-C 39 G2), X-C 36 B3, X-C 39 B4	**0.108** (2.75)	**3/4**[6] (19)	**110** (0.5)	**140** (0.6)	**75** (0.3)	**85** (0.4)	**175** (0.8)	**215** (1.0)
			1[6] (25)	**170** (0.8)	**220** (1.0)	**155** (0.7)	**160** (0.7)	**255** (1.1)	**315** (1.4)
Premium Gas & Battery Fasteners	X-P G2, X-P G3, X-P B3, X-P B4	**0.118** (3.0)	**5/8**[6] (16)	**60** (0.3)	**140** (0.6)	**60** (0.3)	**60** (0.3)	**175** (0.8)	**215** (1.0)

[1]The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

[2]Multiple fasteners are recommended for any attachment.

[3]The steel deck profile is 3" deep composite floor deck with a minimum thickness of 20 gauge (0.0358". Fastener locations when installing into lightweight concrete over metal deck Figure 1 shows the nominal flute dimensions, fastener locations, and load orientations for the deck profile.

[4]Structural lightweight concrete fill above top of metal deck shall be a minimum of 3-1/4" deep, unless otherwise noted.

[5]DS fasteners installed at 1-1/2" embedment through steel deck into the lower flute must be installed at a minimum distance of 6" from the edge of the floor deck.

[6]Structural lightweight concrete fill above top of metal deck shall be a minimum of 2-1/2" deep.

*More details about the innovative X-P and X-U fasteners can be found in X-P Premium Concrete Fasteners and X-U Universal Knurled Shank Fasteners.

Table 3. Allowable Loads Into Minimum f'_c = 3000 psi Structural Lightweight Concrete Over 1-1/2" Deep, B-Type Steel Deck[1,2]

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Fastener location installed through metal deck into concrete [3,4]		
				Tension lb (kN)		Shear lb (kN)
				Upper flute	Lower flute	
Premium Concrete Fastener	X-P*	**0.157** (4.0)	**3/4** (19)	**140** (0.6)	**130** (0.6)	**335** (1.5)
			1 (25)	**215** (1.0)	**215** (1.0)	**385** (1.7)
			1-1/4 (32)	–	**270** (1.2)	**465** (2.1)
Universal Knurled Shank Fastener	X-U*	**0.157** (4.0)	**3/4** (19)	**95** (0.42)	**95** (0.42)	**370** (1.65)
			1 (25)	**125** (0.56)	**125** (0.56)	**415** (1.85)
Standard Fastener	X-C	**0.138** (3.5)	**3/4** (19)	**80** (0.36)	**80** (0.36)	**315** (1.40)
			1 (25)	**205** (0.91)	**205** (0.91)	**445** (1.98)
Gas & Battery Fasteners	X-C G3, X-C B3, X-C B4 (except 36- & 39-mm length)	**0.118** (3.0)	**3/4** (19)	**75** (0.3)	**85** (0.38)	**175** (0.8)
			1 (25)	**155** (0.7)	**160** (0.71)	**255** (1.1)
	X-C G2 (except X-C 39 G2), X-C 36 B3, X-C 39 B4	**0.108** (2.75)	**3/4** (19)	**75** (0.3)	**85** (0.4)	**175** (0.8)
			1 (25)[5]	**155** (0.7)	**160** (0.7)	**255** (1.1)
Premium Gas & Battery Fasteners	X-P G2, X-P G3, X-P B3, X-P B4	**0.118** (3.0)	**5/8** (16)	**60** (0.27)	**60** (0.3)	**175** (0.8)

[1]The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

[2]Multiple fasteners are recommended for any attachment.

[3]Steel deck profiles are 1-1/2" deep, B-type deck with a minimum thickness of 20 gauge (0.0358" thick steel. Fasteners may be installed through the metal deck into lightweight concrete having both nominal and inverted deck profile orientations with a minimum lower flute width of 1-3/4" or 3-1/2", respectively. Fasteners shall be placed at centerline of deck flutes. Refer to Figure 2 and Figure 3 in Fastener locations when installing into lightweight concrete over metal deck for additional flute dimensions, fastener locations, and load orientations for both deck profiles.

[4]Structural lightweight concrete fill above top of metal deck shall be a minimum 2-1/2" deep, unless otherwise noted.

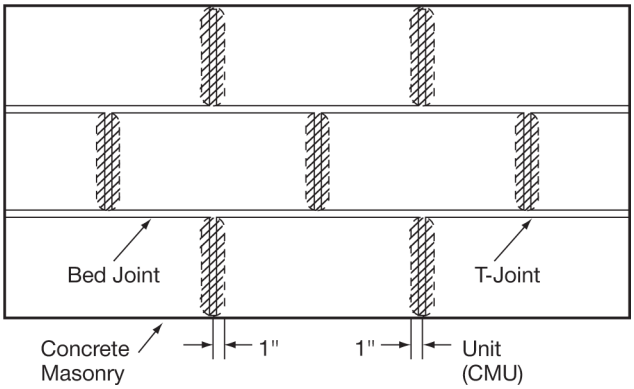
[5]Structural lightweight concrete fill above top of metal deck shall be a minimum of 3-1/4" deep.

*More details about the innovative X-U fastener can be found in X-P Premium Concrete Fasteners and X-U Universal Knurled Shank Fasteners.

Table 4. Allowable Loads in Concrete Masonry Units[1,2,3,4,5,6]

Fastener Description	Fastener	Shank diameter in. (mm)	Min. embed. in. (mm)	Hollow CMU				Grout filled CMU					
				Face shell[7]		Mortar joint		Face shell[7]		Mortar joint		Top of grouted cell[8]	
				Tension lb (kN)	Shear[9] lb (kN)	Tension lb (kN)	Shear[10] lb (kN)	Tension lb (kN)	Shear[9] lb (kN)	Tension lb (kN)	Shear[10] lb (kN)	Tension lb (kN)	Shear[9] lb (kN)
Premium Concrete Fastener	X-P*	**0.157** (4.0)	**1** (25)	**70** (0.31)	**105** (0.47)	**85** (0.38)	**70** (0.31)	**150** (0.67)	**145** (0.65)	**150** (0.67)	**155** (0.69)	**165** (0.73)	**240** (1.07)
Universal Knurled Shank Fasteners	X-U*	**0.157** (4.0)	**1** (25)	**70** (0.31)	**85** (0.38)	**25** (0.11)	**70** (0.31)	**225** (1.00)	**220** (0.98)	**150** (0.67)	**190** (0.85)	**165** (0.73)	**240** (1.07)
Standard Fastener	X-C	**0.138** (3.5)	**3/4** (19)	**40** (0.18)	**85** (0.38)	**25** (0.11)	**50** (0.22)	**100** (0.44)	**105** (0.47)	**45** (0.20)	**80** (0.36)	**115** (0.51)	**175** (0.78)
Gas & Battery Fasteners	X-C G3, X-C B3, X-C B4 (except 36- & 39-mm lengths)	**0.118** (3.0)	**3/4** (19)	**145** (0.65)	**190** (0.85)	**80** (0.36)	**80** (0.36)	**155** (0.69)	**195** (0.87)	**110** (0.49)	**135** (0.60)	**105** (0.47)	**145** (0.65)
			1 (25)	**185** (0.82)	**205** (0.91)	**105** (0.47)	**105** (0.47)	**205** (0.91)	**215** (0.96)	**135** (0.60)	**190** (0.85)	**120** (0.53)	**150** (0.67)
Gas Fastener	X-C G2 (except X-C 39 G2), X-C 36 B3, X-C 39 G3	**0.108** (2.7)	**3/4** (19)	**75** (0.33)	**140** (0.62)	**60** (0.27)	**80** (0.36)	**100** (0.44)	**170** (0.76)	**100** (0.44)	**160** (0.71)	**80** (0.36)	**130** (0.58)
			1 (25)	**110** (0.49)	**190** (0.85)	**70** (0.31)	**145** (0.65)	**135** (0.60)	**195** (0.87)	**125** (0.56)	**165** (0.73)	**110** (0.49)	**145** (0.65)
	X-C 39 G2, X-C 39 G3	**0.101** (2.6)	**5/8** (25)	**60** (0.49)	**110** (0.85)	**45** (0.31)	**65** (0.65)	**85** (0.60)	**110** (0.87)	**55** (0.56)	**105** (0.73)	-	-

[1]The tabulated allowable load values are for the low-velocity fastener only, using a safety factor of 5.0 or higher calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
[2]The tabulated allowable load values are for low-velocity fasteners installed in normal weight or lightweight concrete masonry units conforming to ASTM C90.
[3]The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with mortar conforming to ASTM C270, Type N or S.
[4]The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with grout conforming to ASTM C476, as coarse grout.
[5]Multiple fasteners are recommended for any attachment.
[6]The tabulated allowable load values are for one low-velocity fastener installed in an individual masonry unit cell and at least 4" from the edge of the wall.
[7]Fastener can be located anywhere on the face shell or mortar joint as shown in the figure to the right.
[8]Fastener located in center of grouted cell installed vertically.
[9]Shear can be in any direction.
[10]Shear direction can be horizontal or vertical (Bed Joint or T-Joint) along the CMU wall plane.



Acceptable locations (NON-SHADED AREAS) for power-actuated fasteners in CMU walls

*More details about the innovative X-P and X-U fasteners can be found in X-P Premium Concrete Fasteners and X-U Universal Knurled Shank Fasteners.

Table 5. Allowable loads in minimum ASTM A36 ($F_y \geq 36$ ksi, $F_u \geq 58$ ksi) steel[1,2,3,4]

Fastener description	Fastener	Shank diameter in. (mm)	Steel thickness (in.)											
			1/8		3/16		1/4		3/8		1/2		≥3/4	
			Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
Universal knurled shank*	X-U[5]	**0.157** (4.0)	–	–	**500** (2.22)	**720** (3.20)	**775** (3.45)	**720** (3.20)	**935** (4.16)	**720** (3.20)	**900** (4.00)	**720** (3.20)	**350** (1.56)	**375** (1.67)
Stepped-shank knurling-lengthwise	X-U 15[6]	**0.145** (3.7)	–	–	**155** (0.69)	**395** (1.76)	**230** (1.02)	**395** (1.76)	**420** (1.87)	**450** (2.00)	**365** (1.62)	**500** (2.22)	**365** (1.62)	**400** (1.78)
Standard knurled shank	X-S13	**0.145** (3.7)	**140** (0.62)	**300** (1.33)	**300** (1.33)	**450** (2.00)	**300** (1.33)	**450** (2.00)	**300** (1.33)	**450** (2.00)	–	–	–	–
Drywall smooth shank w/metal top hat washer	X-S16[7]	**0.145** (3.7)	–	–	**315** (1.40)	**480** (2.14)	**315** (1.40)	**480** (2.14)	**315** (1.40)	**530** (2.36)	**315** (1.40)	**480** (2.14)	–	–
Heavy duty knurled shank	EDS[8]	**0.177** (4.5)	–	–	**305** (1.36)	**615** (2.74)	**625** (2.78)	**870** (3.87)	**715** (3.18)	**870** (3.87)	**890** (3.96)	**960** (4.27)	**400** (1.78)	**655** (2.91)
Heavy duty smooth shank	DS	**0.177** (4.5)	–	–	**365** (1.62)	**725** (3.22)	**580** (2.58)	**725** (3.22)	**695** (3.09)	**725** (3.22)	**735** (3.27)	**860** (3.83)	–	–
Stainless steel smooth shank	X-R[9], X-CR	**0.145** (3.7) **0.157** (4.0)	–	–	**460** (2.05)	**460** (2.05)	**615** (2.74)	**500** (2.22)	–	–	–	–	–	–
	X-R[9,10]	**0.145** (3.7)	**300** (1.33)	**190** (0.85)	**615** (2.74)	**495** (2.20)	**760** (3.38)	**500** (2.22)	**220** (0.98)	**325** (1.45)	**225** (1.00)	**335** (1.49)	–	–
Standard gas & battery fasteners for steel	X-S 14 G3, X-S 14 B3, X-S 14 B4	**0.118** (3.0)	**140** (0.62)	**230** (1.02)	**220** (0.98)	**245** (1.09)	**225** (1.00)	**290** (1.29)	**280** (1.25)	**330** (1.47)	**280** (1.25)	**330** (1.47)	**280** (1.25)	**330** (1.47)
	X-S 14 G3[10], X-S 14 B3[10], X-S 14 B4[10]	**0.118** (3.0)	–	–	**220** (0.98)	**295** (1.31)	**260** (1.16)	**355** (1.58)	**280** (1.25)	**385** (1.71)	**280** (1.25)	**385** (1.71)	**280** (1.25)	**385** (1.71)
Premium gas & battery fasteners	X-P G3, X-P B3, X-P B4	**0.118** (3.0)	**125** (0.56)	**230** (1.02)	**170** (0.76)	**245** (1.09)	**200** (0.89)	**230** (1.02)	**250** (1.11)	**255** (1.13)	–	–	–	–

[1]The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
[2]Low-velocity fasteners shall be driven to where the point of the fastener penetrates through the steel base material in accordance with Base Steel Thickness and Fastener Driving Distance Requirements, except as noted in this table.
[3]Multiple fasteners are recommended for any attachment.
[4]Refer to guidelines for fastening to steel for application limits.
[5]Tabulated allowable load values provided for 3/4" steel are based upon minimum point penetration of 1/2" into the steel. If 1/2" point penetration into the steel is not achieved, but a point penetration of at least 3/8" is obtained, the tabulated tension value should be reduced by 20 percent and the tabulated shear load should be reduced by 8 percent.
[6]X-U 15 fasteners installed into greater than 3/8" thick steel require 15/32" minimum penetration into the steel.
[7]Published values may vary from values in ICC-ESR
[8]EDS fasteners installed into greater than 1/2" thick steel require 1/2" minimum penetration.
[9]Fasteners installed into 3/8" or thicker base require 0.38" minimum penetration depth into the steel.
[10]Based on testing with F_y = 50 ksi base material.

Table 6. Allowable tensile pullover and shear bearing load capacities for steel framing with power driven fasteners[1,2,3,4]

Fastener description	Fastener	Head dia. in. (mm)	Sheet steel thickness													
			14 ga.		16 ga.		18 ga.		20 ga.		22 ga.		24 ga.		25/26 ga.	
			Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
0.157" shank with or w/o plastic washers or MX collation	X-U, X-P	**0.322** (8.2)	**825** (3.67)	**1,085** (4.83)	**685** (3.05)	**720** (3.20)	**490** (2.18)	**525** (2.34)	**360** (1.60)	**445** (1.98)	**300** (1.33)	**330** (1.47)	**205** (0.91)	**255** (1.13)	**120** (0.53)	**145** (0.64)
0.145" shank with or w/o plastic washers or MX collation	X-C, X-R	**0.322** (8.2)	–	**985** (4.38)	**685** (3.05)	**720** (3.20)	**490** (2.18)	**515** (2.29)	**360** (1.60)	**440** (1.96)	**300** (1.33)	**310** (1.38)	**205** (0.91)	**235** (1.05)	**120** (0.53)	**145** (0.64)
0.177" shank without washer	DS, EDS	**0.322** (8.2)	**965** (4.29)	**1,085** (4.83)	**810** (3.60)	**815** (3.63)	**625** (2.78)	**535** (2.38)	**460** (2.05)	**465** (2.07)	**360** (1.60)	**350** (1.56)	**300** (1.33)	**260** (1.16)	**240** (1.07)	**180** (0.80)
0.145" shank with plastic top hat washers	X-S13 THP, X-S16 TH	**0.322** (8.2)	–	**985** (4.38)	**685** (3.05)	**720** (3.20)	**490** (2.18)	**515** (2.29)	**360** (1.60)	**440** (1.96)	**300** (1.33)	**310** (1.38)	**205** (0.91)	**235** (1.05)	**120** (0.53)	**145** (0.64)

[1]Allowable load values are based on a safety factor of 3.0.
[2]Allowable pullover capacities of sheet steel should be compared to the allowable fastener tensile load capacities in concrete, steel, and masonry to determine controlling resistance load.
[3]Allowable shear bearing capacities of sheet steel should be compared to allowable fastener shear capacities in concrete, steel and masonry to determine controlling resistance load.
[4]Data is based on the following minimum sheet steel properties, F_y = 33 ksi, F_u = 45 ksi (ASTM A653 material).

*More details about the innovative X-U fastener can be found in X-P Premium Concrete Fasteners and X-U Universal Knurled Shank Fasteners.

In the US
Hilti, Inc.
7250 Dallas Parkway, Suite 1000
Plano, TX 75024

Customer Service: 1-800-879-8000
en español: 1-800-879-5000
Fax: 1-800-879-7000

www.hilti.com

In Canada:
Hilti (Canada) Corporation
2201 Bristol Circle
Oakville ON | L6H 0J8
Canada

Customer Service: 1-800-363-4458
Fax: 1-800-363-4459

www.hilti.ca

The data contained in this literature was current as of the date of publication. Updates and changes may be made based on later testing. If verification is needed that the data is still current, please contact the Hilti Technical Support Specialists at 1-800-879-8000. All published load values contained in this literature represent the results of testing by Hilti or test organizations. Local base materials were used. Because of variations in materials, on-site testing is necessary to determine performance at any specific site. Printed in the United States.